

CLAIMS

1. An image correction apparatus comprising:
image input means;
storage means;
central processing means; and
image output means,
the image correction apparatus comprising:
side-sloping image correction means for correcting an
image of a document whose top and bottom sides make a slope with
respect to a document platen.
2. The image correction apparatus of claim 1, wherein the side
sloping image correction means includes edge detection means
for detecting edges of the document; binding position detection
means for obtaining a binding position of the document;
reference line detection means for obtaining a reference line
for the position of the document; document end point detection
means for obtaining left and right end points of the document
on the basis of variations in image luminance near the edges;
side slope angle computing means for computing slope angles of
the top and bottom sides of the document on the basis of the
reference line and the binding position; three-dimensional edge
position computing means for computing three-dimensional
positions of upper and lower edges of the document on the basis
of the edges and the slope angles; document shape computing means

for computing a shape of a whole of the document on the basis of the three-dimensional positions of the edges; and luminance correction parameter computing means for obtaining background luminance of a correction target pixel from the image on the basis of the three-dimensional shape of the document and obtaining a luminance correction parameter for the pixel on the basis of the background luminance and target luminance, and an input image is corrected using the luminance correction parameter and the three-dimensional shape of the document.

3. The image correction apparatus of claim 2, wherein, from an area where a change of edge position is small, the edge detection means detects segments longer than a predetermined length and, for any other portion than the detected segments, a position interpolated from segments detected before and after that portion is taken as a position of a document edge.

4. The image correction apparatus of claim 2, wherein, of maximum or minimum points of positions of edges detected by the edge detection means, the binding position detection means detects those nearest to a center of the image as representing the binding position.

5. The image correction apparatus of claim 2, wherein, of segments where a pixel value of an image near each edge is larger

than a first reference value and where an amount of change of edge slope is smaller than a second reference value, the reference line detection means detects an average edge slope in the longest segment as a slope of the reference line, and takes a straight line, extended from an end point outside the document along the longest segment with the thus detected slope, as the reference line, the reference line being detected for each of the left and right edges or the upper and lower edges of the document.

6. The image correction apparatus of claim 2, wherein the document end point detection means detects the end points of the document, based on different criteria between the left and right pages of the document.

7. The image correction apparatus of claim 2, wherein the document shape computing means approximates a document surface by a set of straight lines connecting between the lower and upper edges, and obtains a three-dimensional position of the document surface on the basis of a dividing ratio in which the positions of upper and lower end points of the straight lines are divided.

8. The image correction apparatus of claim 7, wherein, when computed edge lengths of the upper and lower edges differ from each other, the document shape computing means corrects the

three-dimensional positions of the edges so that the lengths becomes equal to each other.

9. The image correction apparatus of claim 7 or 8, wherein, when computed vertical lengths of the left and right pages differ from each other, the document shape computing means corrects three-dimensional shape data of the document so that the vertical lengths becomes equal to each other.

10. The image correction apparatus of any one of claims 2 and 7 to 9, wherein the document shape computing means includes image reducing means for reducing an input image in accordance with a predetermined reduction ratio and, after obtaining the three-dimensional shape of the document from a reduced image, corrects the three-dimensional shape data of the document in accordance with the reduction ratio.

11. The image correction apparatus of claim 1 or 2, wherein the luminance correction parameter computing means obtains the background luminance of the correction target pixel on the basis of a dividing ratio of an image luminance near the upper and lower end points of the straight lines of claim 7 which are used to approximate the document surface, and takes the ratio of a target luminance to the background luminance as a luminance correction parameter.

12. The image correction apparatus of any one of claims 1, 2 and 4, wherein the side sloping image correction means converts a pixel value near the binding position to blank space, and outputs a converted pixel value to the image output means.

13. The image correction apparatus of any one of claims 1, 2 and 4, wherein the side sloping image correction means converts a pixel value near the binding position to a pixel value at a position distanced from the binding position, and outputs a converted pixel value to the image output means.

14. The image correction apparatus of claim 2 or 10, wherein the side sloping image correction means performs image reading for producing the reduced image separately from image reading for reading the correction target pixel.

15. The image correction apparatus of any one of claims 1 to 14, further comprising:

correction selecting means for making a selection as to whether image correction is applied or not,

wherein image input means for inputting an image by using input characteristics which vary depending on whether image correction is carried out or not.

16. The image correction apparatus of any one of claims 1 to 15, further comprising:

document region detection means for detecting a document region from an input image,

wherein when the document region runs over the image, image correction is not carried out.